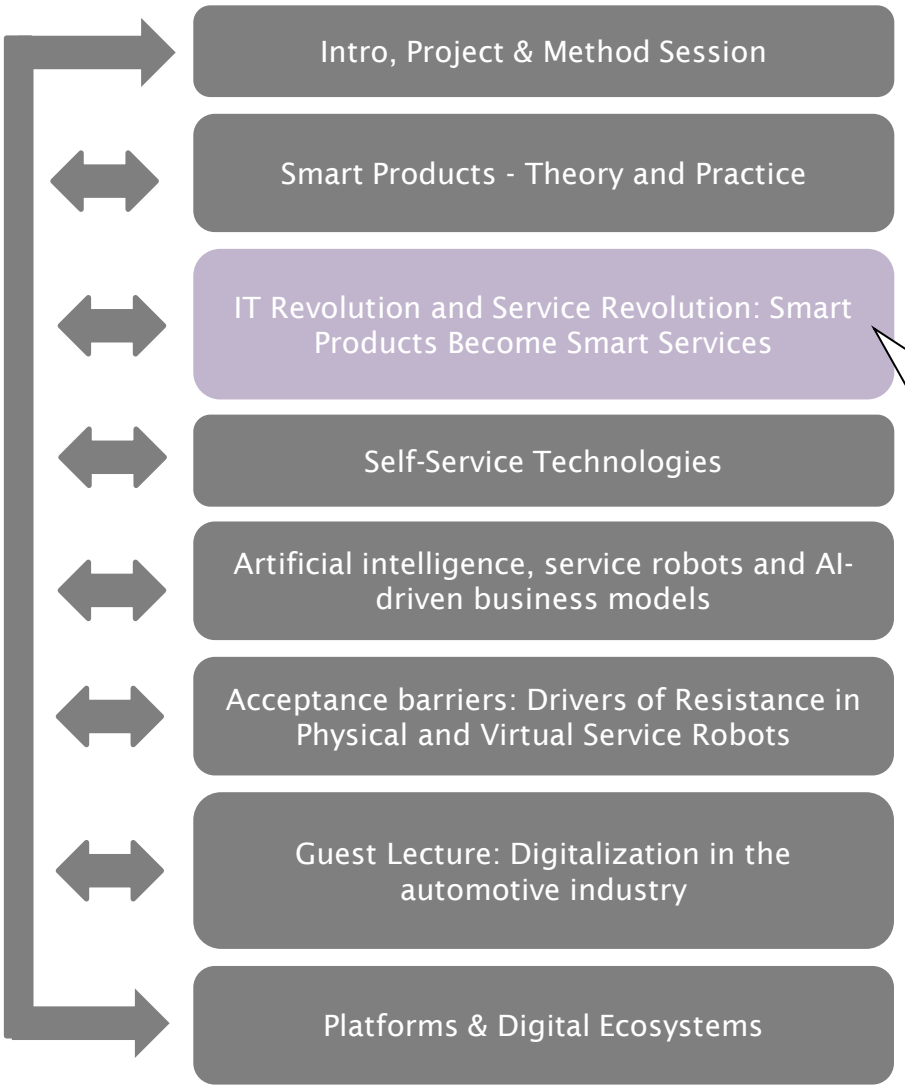
IT Revolution and Service Revolution

Dr. Stefan Raff

Berner Fachhochschule | Haute école spécialisée bernoise | Bern University of Applied Sciences

THEMATIC STRUCTURE OF THIS MODULE



- How is digitization changing the service sector?
- Static vs. dynamic provisioning of services
- How does a "smart" service work?
- What role do artificial intelligence (AI) and service robots play in services marketing?

IT revolution and service revolution: smart products become smart services

SERVICES IN EVERYDAY LIFE ARE INCREASINGLY TECHNOLOGY-DRIVEN

- **Finance**

Zak

Deutsche Bank

PayPal

Allianz

N26

UBS

- **Education**

Berner Fachhochschule

Universität St.Gallen

edX

coursera

- **Travel and tourism**

trivago

TUI

airbnb

- **(Digital) Mobility Services**

SHARENOW

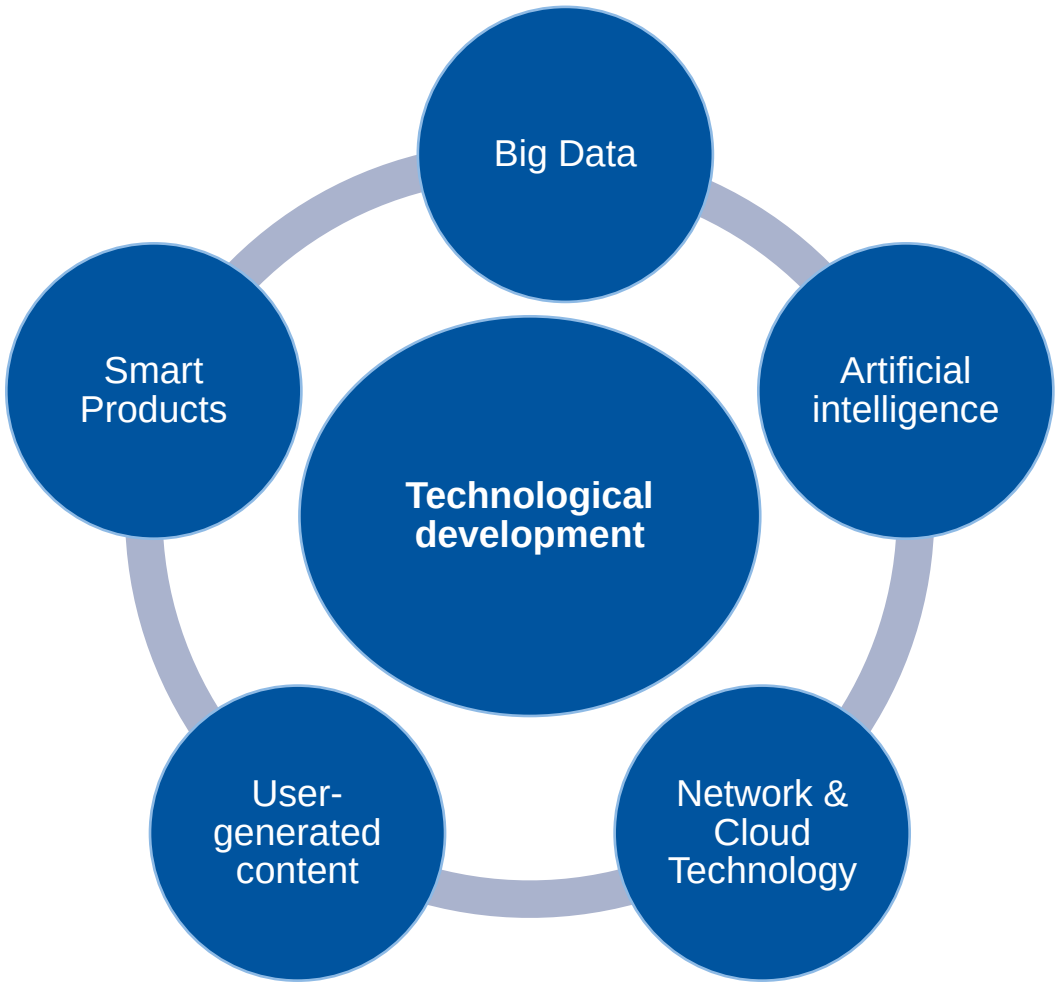
moovel

UBER

mobility car sharing

Lime

- **Freight transport**
- **Doctors/medical treatment**
- **Hairdressers**
- **Management consultancies**
- **Gastronomy**
- **...**



Peer-to-peer services
e.g. Airbnb for short-term accommodation at private prices

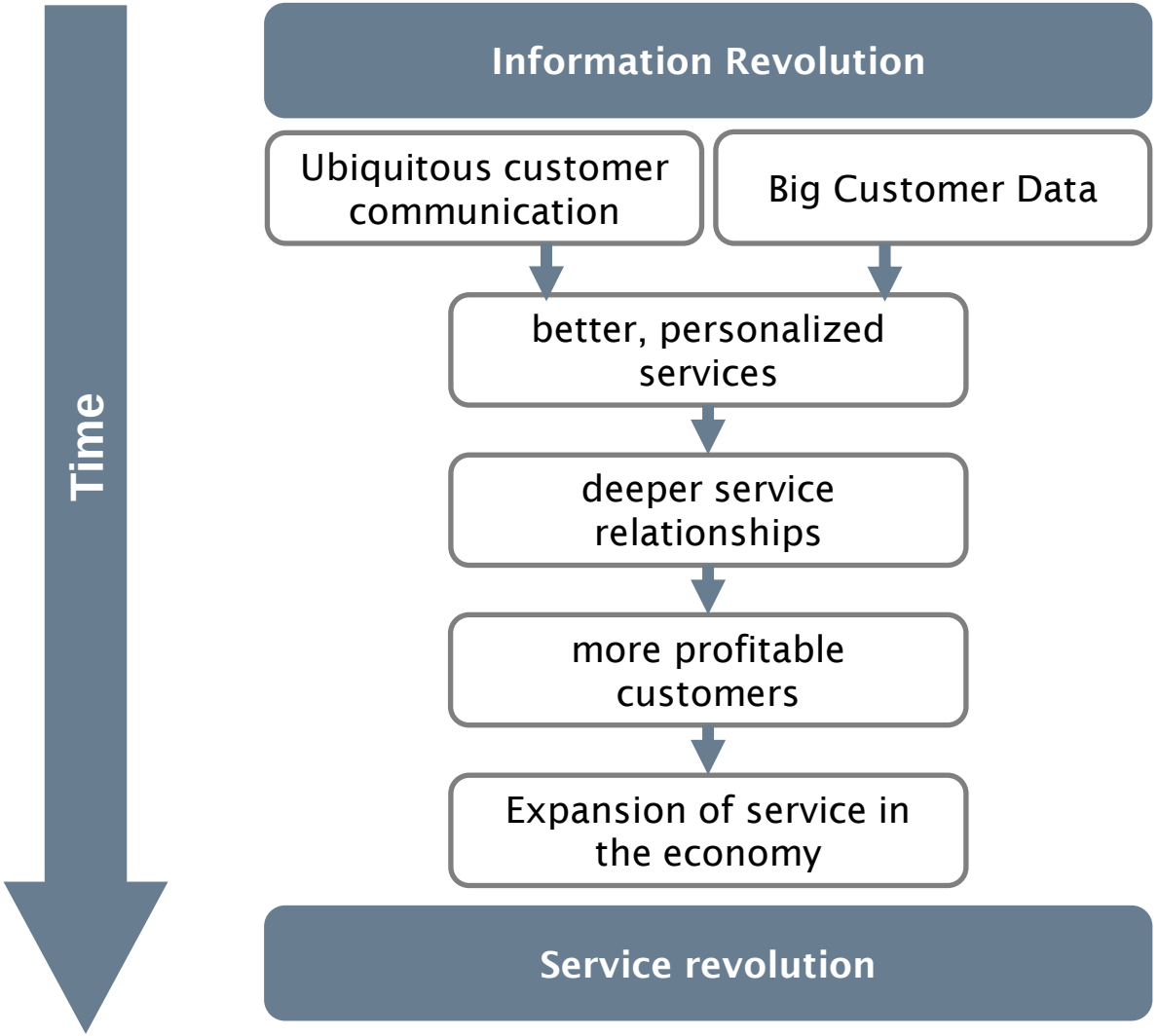
Crowd-based services
e.g. crowdSPRING as a provider of logo and graphic design services

Integrators
e.g. Uber connects passengers with independent drivers via apps

AI Services / Robo Advice
e.g. ROBIN - digital asset management of Deutsche Bank

Functions on demand
e.g. Audi advanced light package „over-the-air“

FROM INFORMATION REVOLUTION TO SERVICE REVOLUTION



Source: Huang & Rust (2014)

Smart services

What is a "Smart Service"?

SMART SERVICE AND SMART SERVICE TYPES

Smart Service

Services provided by "intelligent products" (smart products) are referred to as smart services.

- **Provider Active Service**
  E.g. remote monitoring of printers and copiers at Heidelberger Druckmaschinen
- **Self-Services**
  E.g. provision of various information on demand in a connected car
- **Smart Interactive Services**
  E.g. remote treatment in the field of telemedicine
- **Machine-to-Machine Services**
  E.g. autonomous device updates or regular payment flows

Source: Allmendinger & Lombreglia (2005); Wünderlich, Wangenheim & Bitner (2012).

Products and services in the digital age

Drones

Location-Based Services

Smart Home Assistants

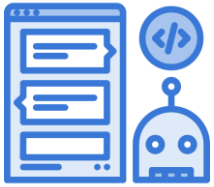
Streaming Services

Smartwatch

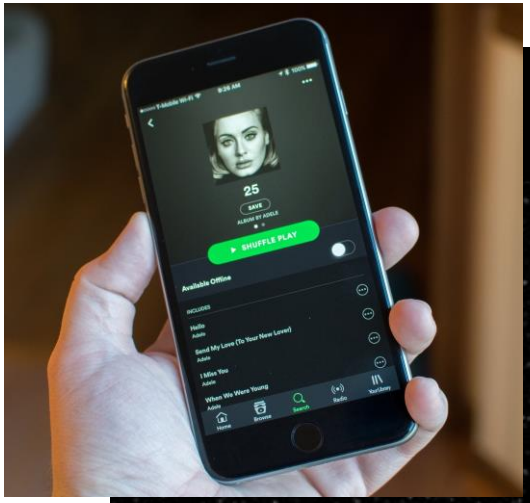
Payment services

Smart Home

Advice Services



Internet-of-Things



Premium Hilfe Herunterladen | Registrieren Anmelden

Lass Dich inspirieren.

Dein Mix der Woche. Jeden Montag eine Playlist speziell für Dich.

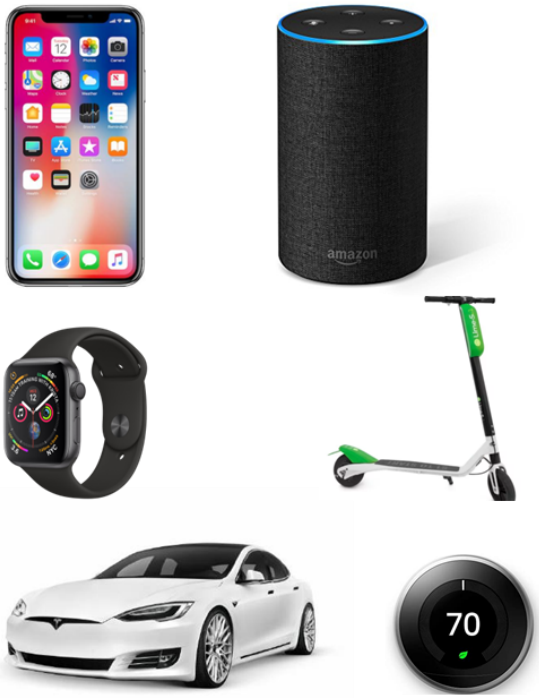
SPOTIFY GRATIS LADEN PLAYLIST ANHÖREN

Um die Playlist „Dein Mix der Woche" zu erstellen, müssen wir Deinen Musikgeschmack erst einige Wochen kennenlernen. Hole Dir also Spotify und höre, was Dir gefällt. Wenn Du bereits registriert bist, dann klick auf „Playlist anhören", um zu erfahren, ob Deine Playlist schon erstellt ist.

Interplay of smart products and smart services

SMART PRODUCTS ENABLE SMART SERVICES

Smart Product



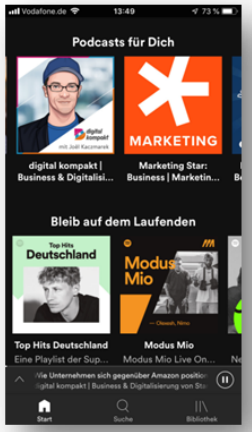
Cloud Computing & Data Analytics

Spotify
Lime
STRAVA
komoot
UBER

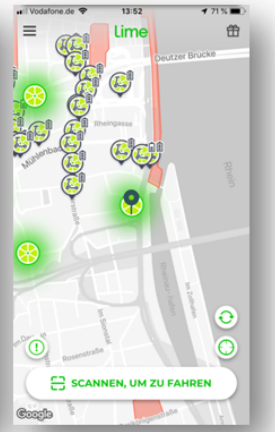
Big customer data

Smart Service

Entertainment Services

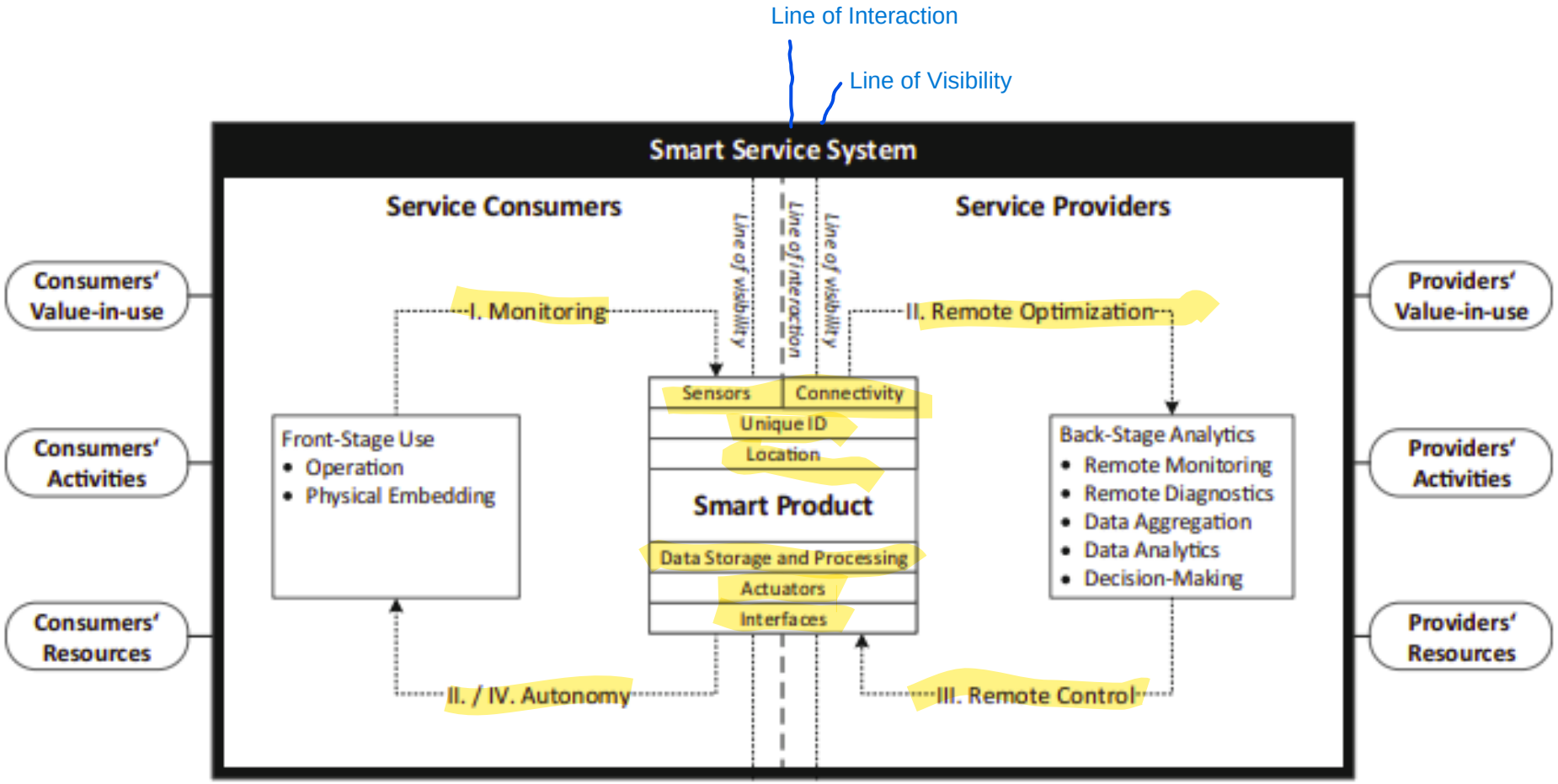


Mobility Services



Continuous Feedback

SMART SERVICE SYSTEM



Source: Beverungen et al. (2017)

STATIC VS. DYNAMIC PROVISION OF SERVICES

Company

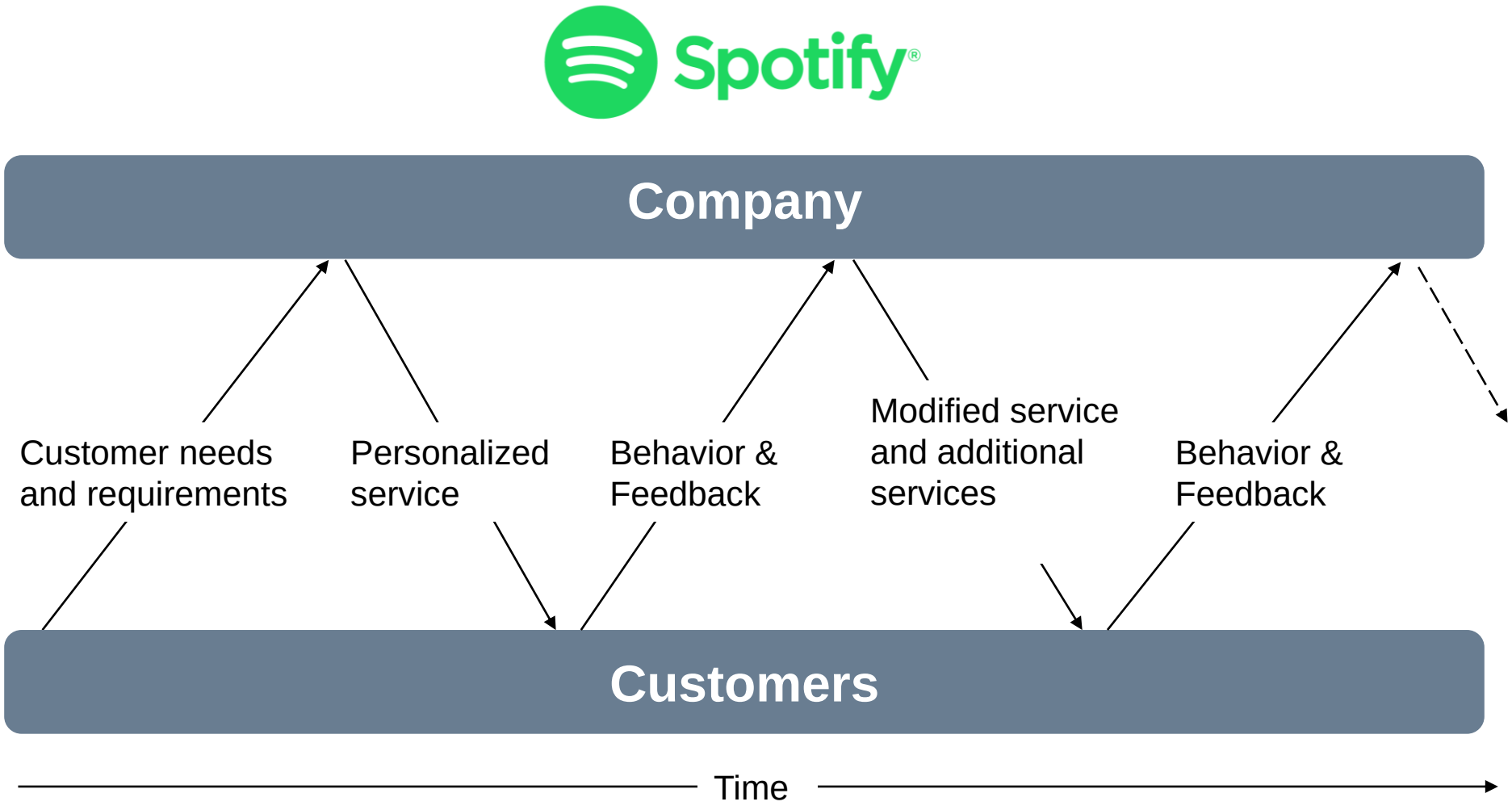
Standardized Service

Aggregated customer information from market research

Customers

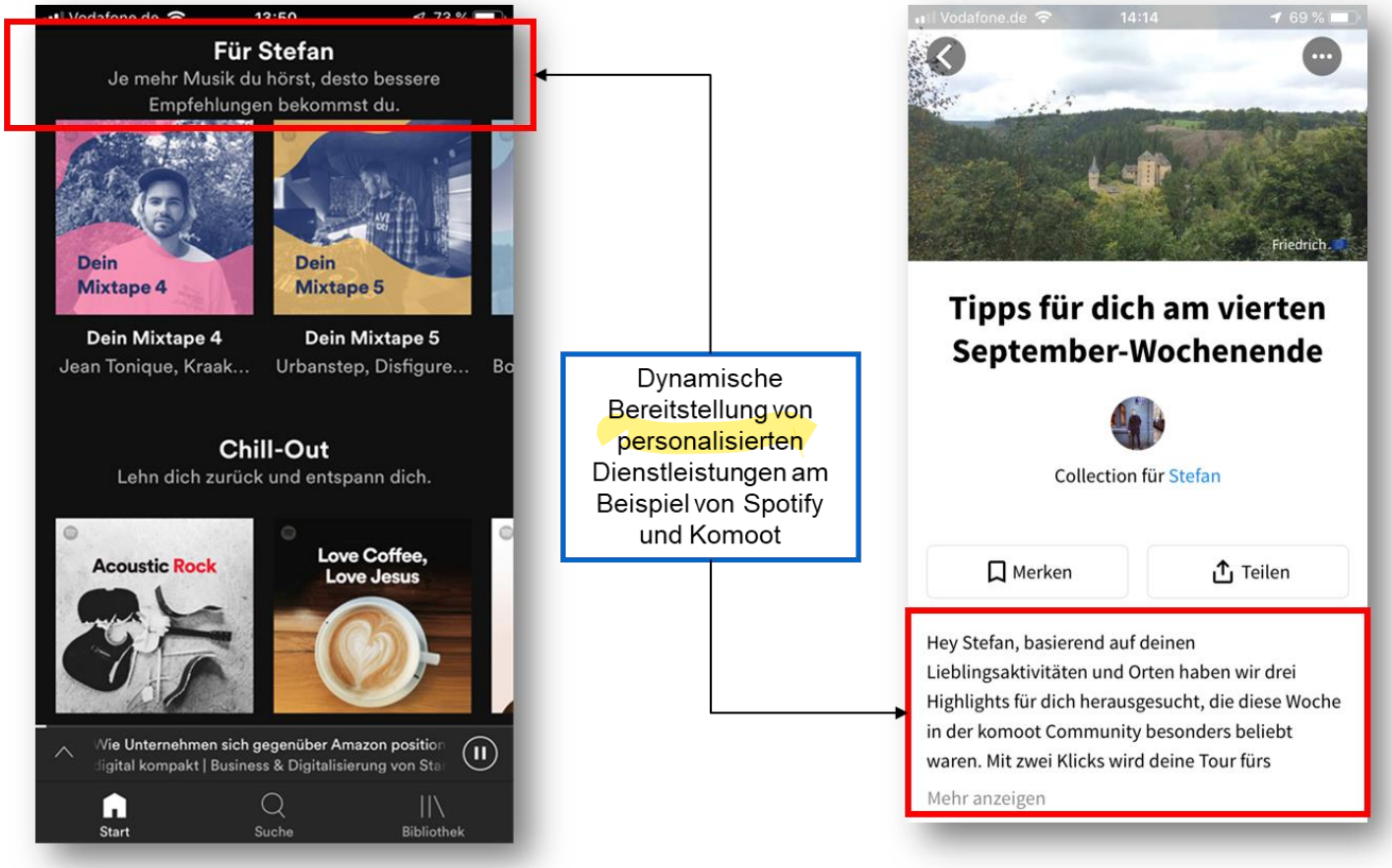
Source: Huang & Rust (2014)

STATIC VS. DYNAMIC PROVISION OF SERVICES



Source: Huang & Rust (2014)

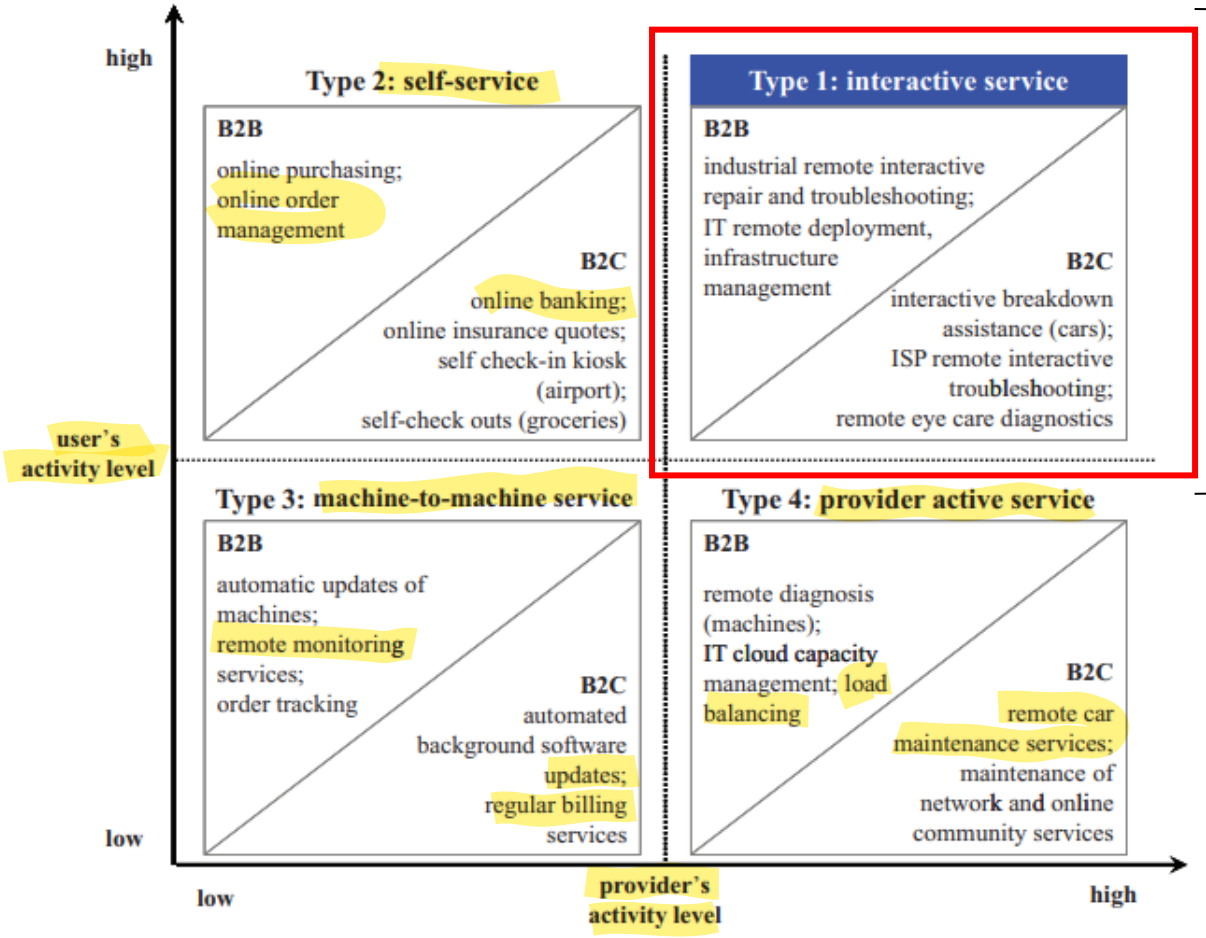
EXAMPLES OF DYNAMIC SERVICE SCENARIOS



Smart Interactive Services

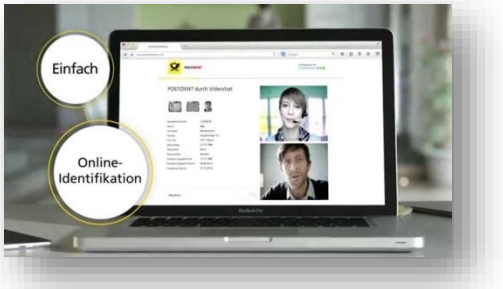
SMART SERVICE INTERACTIVITY MATRIX

Provider Activity High
User Activity High

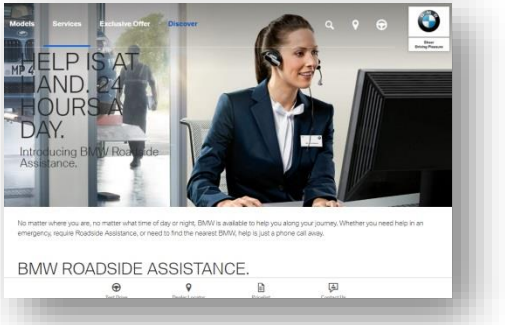


"Smart Interactive Services"

Postident procedure

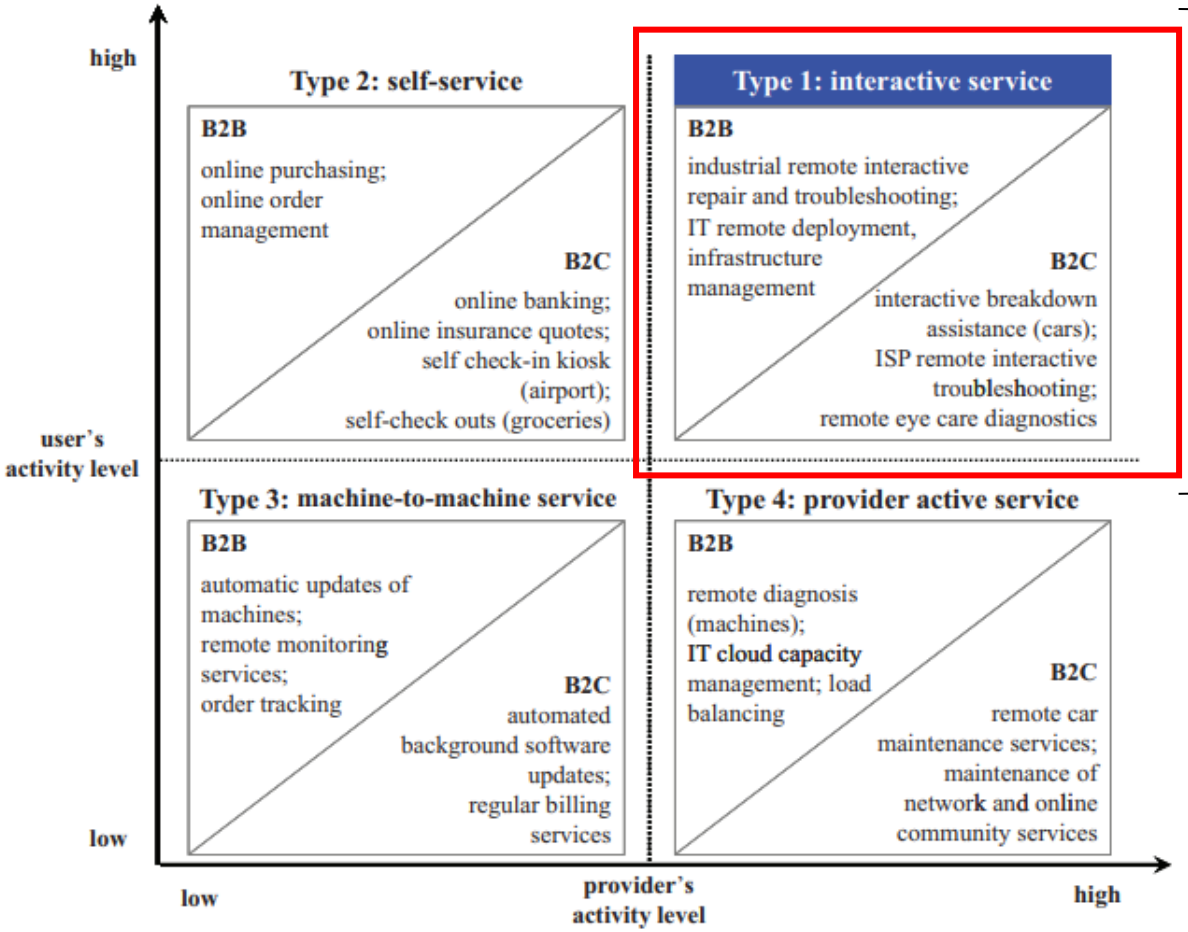


BMW Road Assistance



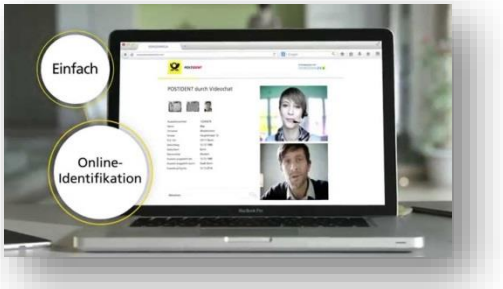
Source: Wünderlich, Wangenheim & Bitner (2012)

SMART SERVICE INTERACTIVITY MATRIX

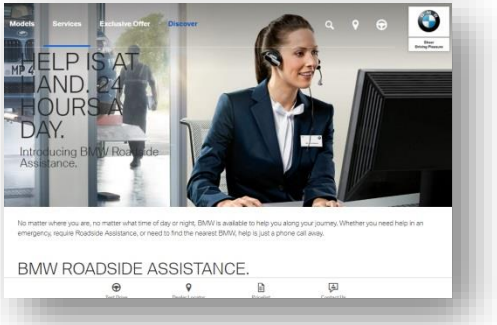


"Smart Interactive Services"

Postident procedure



BMW Road Assistance



Source: Wünderlich, Wangenheim & Bitner (2012)

Smart Interactive Service

"Smart Interactive Services," unlike other technology-based services, require significant human-to-human interaction and collaboration in addition to the technology used.

- Requires **significant interaction** and **collaboration** between user/customer and service provider, e.g., troubleshooting Apple (forgotten Apple ID) or lost PUK (Vodafone hotline).
- Both components, the **perception of the technology** itself and the **interaction with the provider of** the Smart Interactive Service play an essential role in the user's service experience.
- A Smart Interactive Service requires the customer to collaborate with the provider, leading to a potentially high degree of **"service co-production."**

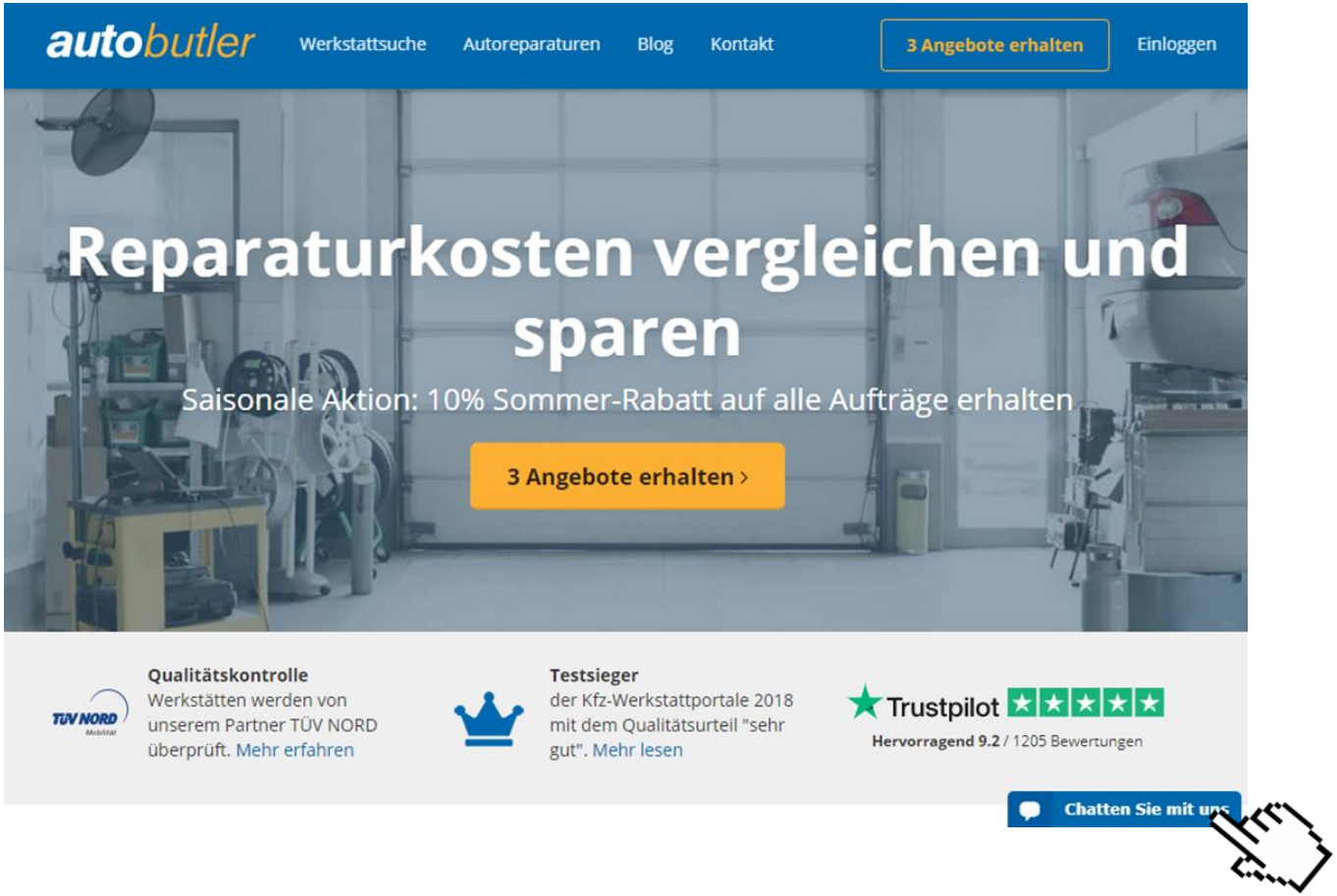
Source: Wünderlich, Wangenheim & Bitner (2012)

HIGHLY INTERACTIVE SERVICES (EXAMPLE: POSTIDENT PROCEDURE)

- **Finance:** e.g. opening an online account, Bitcoin wallet.
- **Mobility:** e.g. registration for car sharing (DriveNow, car2go, Cambio)
- **Telecommunications:** e.g. for the activation of SIM cards
- **Health:** e.g. e-health platforms

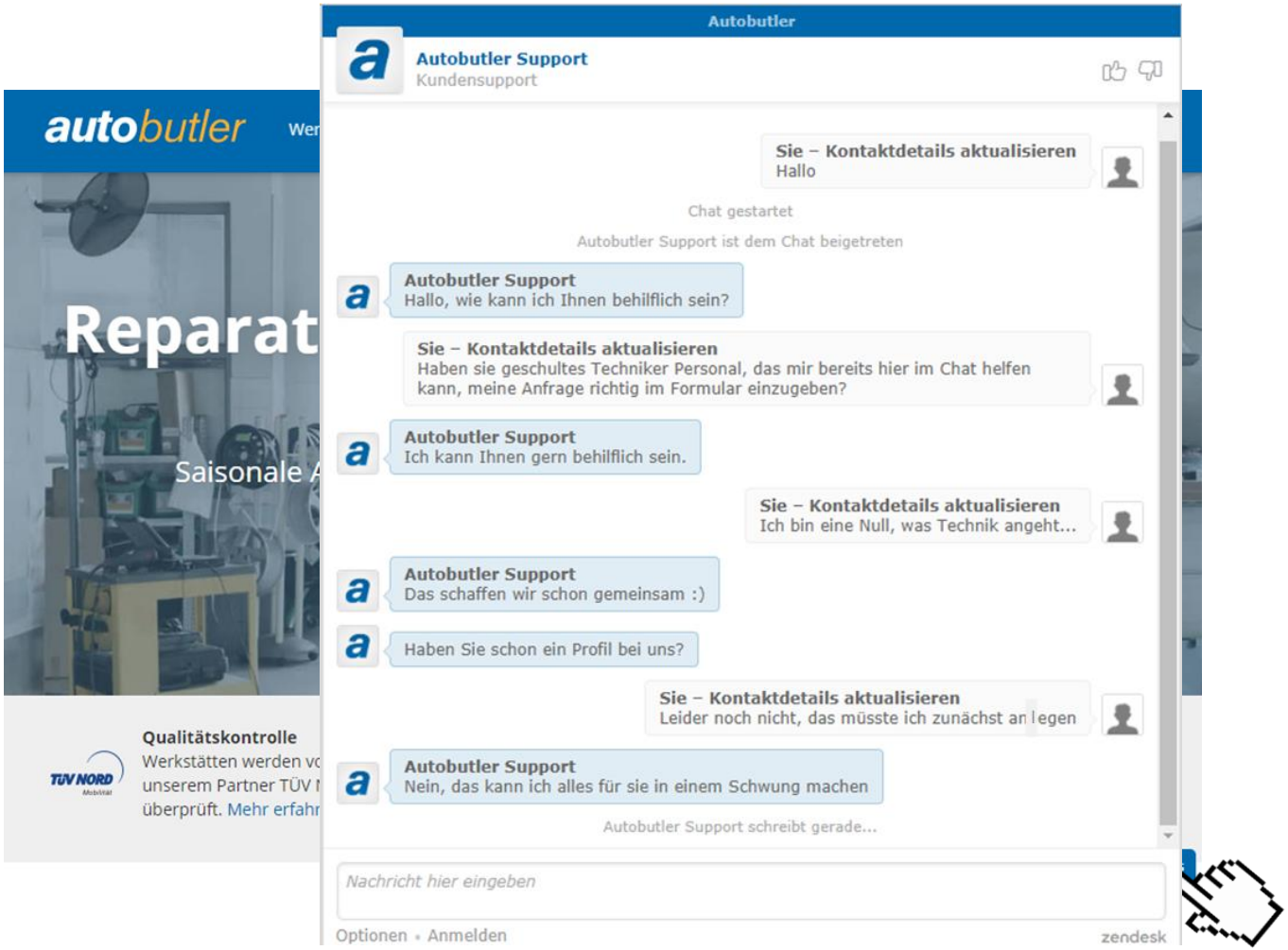
Source: https://www.deutschepost.de/de/p/postident.html

HIGHLY INTERACTIVE SERVICES (EXAMPLE: AUTOBUTLER)



Source: autobutler.com

HIGHLY INTERACTIVE SERVICES (EXAMPLE: AUTOBUTLER)

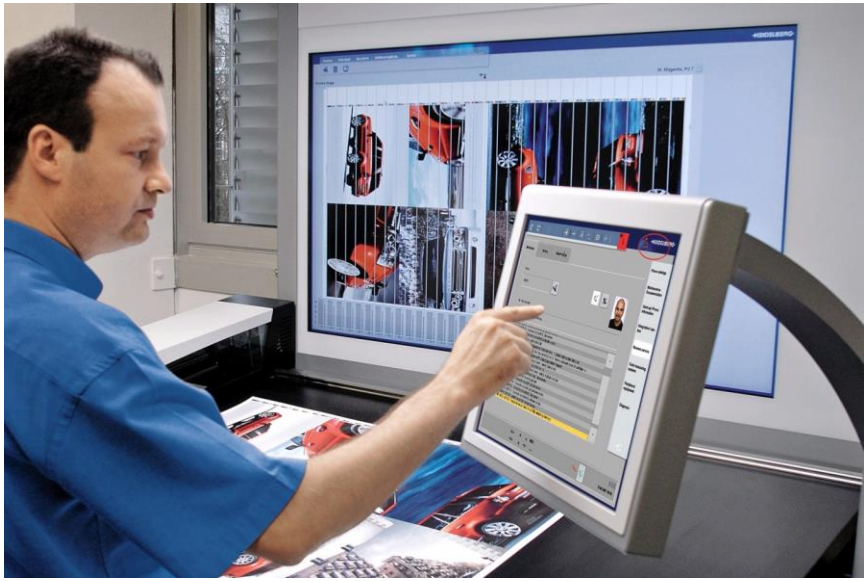


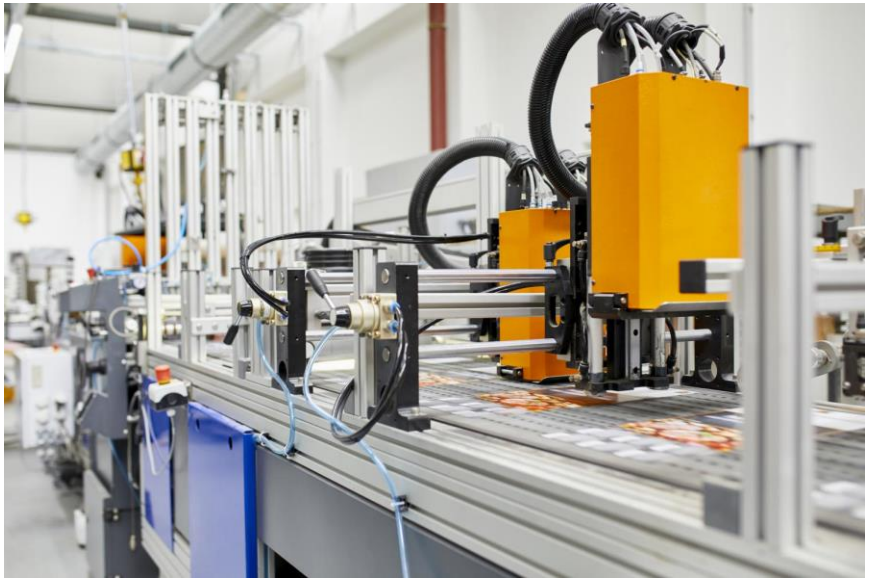
Source: autobutler.com

Study: Interactive smart services in industry (large printing plant)

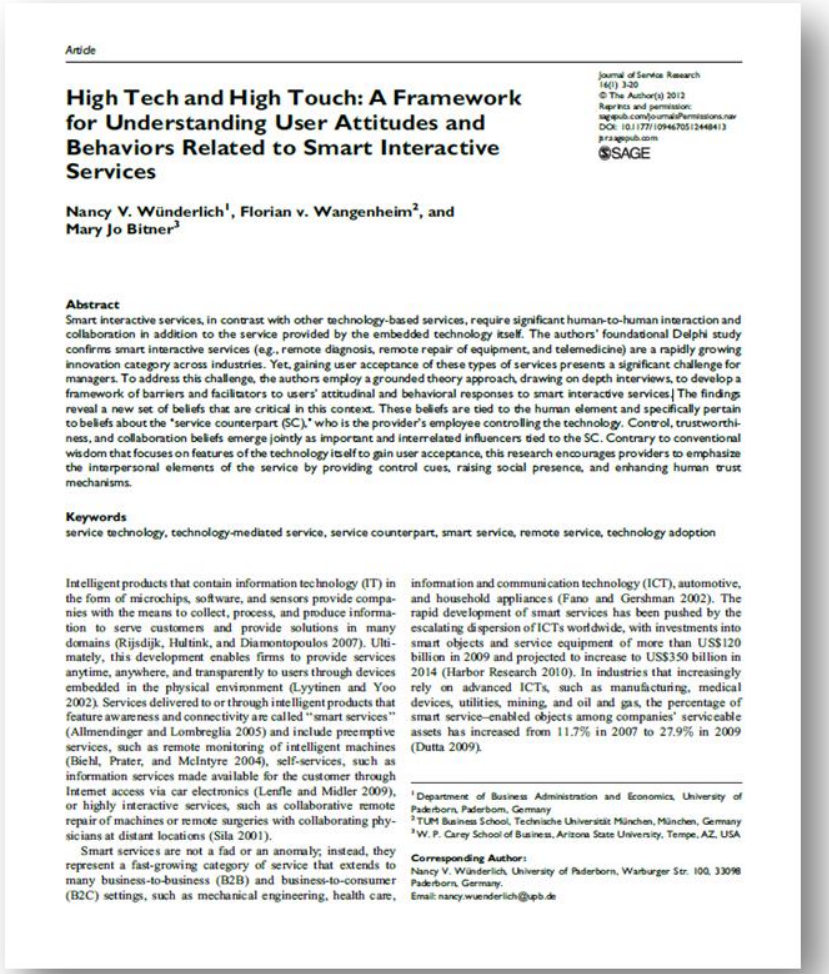
Berner Fachhochschule | Haute école spécialisée bernoise | Bern University of Applied Sciences

Smart Interactive & Remote Service at Heidelberger Druckmaschinen





Source: http://www.worldofprint.de/2015/02/07/zehn-jahre-heidelberg-remote-service/



Article

High Tech and High Touch: A Framework for Understanding User Attitudes and Behaviors Related to Smart Interactive Services

Journal of Service Research
16(1) 3-20

DOI: 10.1177/1094670512448413
jsr.sagepub.com
SAGE

Nancy V. Wünderlich[1], Florian v. Wangenheim[2], and Mary Jo Bitner[3]

Abstract

Smart interactive services, in contrast with other technology-based services, require significant human-to-human interaction and collaboration in addition to the service provided by the embedded technology itself. The authors' foundational Delphi study confirms smart interactive services (e.g., remote diagnosis, remote repair of equipment, and telemedicine) are a rapidly growing innovation category across industries. Yet, gaining user acceptance of these types of services presents a significant challenge for managers. To address this challenge, the authors employ a grounded theory approach, drawing on depth interviews, to develop a framework of barriers and facilitators to users' attitudinal and behavioral responses to smart interactive services. The findings reveal a new set of beliefs that are critical in this context. These beliefs are tied to the human element and specifically pertain to beliefs about the "service counterpart (SC)," who is the provider's employee controlling the technology. Control, trustworthiness, and collaboration beliefs emerge jointly as important and interrelated influencers tied to the SC. Contrary to conventional wisdom that focuses on features of the technology itself to gain user acceptance, this research encourages providers to emphasize the interpersonal elements of the service by providing control cues, raising social presence, and enhancing human trust mechanisms.

Keywords

service technology, technology-mediated service, service counterpart, smart service, remote service, technology adoption

Intelligent products that contain information technology (IT) in the form of microchips, software, and sensors provide companies with the means to collect, process, and produce information to serve customers and provide solutions in many domains (Rijsdijk, Hultink, and Diamontopoulos 2007). Ultimately, this development enables firms to provide services anytime, anywhere, and transparently to users through devices embedded in the physical environment (Lyytinen and Yoo 2002). Services delivered to or through intelligent products that feature awareness and connectivity are called "smart services" (Allmendinger and Lombreglia 2005) and include preemptive services, such as remote monitoring of intelligent machines (Biehl, Prater, and McIntyre 2004), self-services, such as information services made available for the customer through Internet access via car electronics (Lenfle and Midler 2009), or highly interactive services, such as collaborative remote repair of machines or remote surgeries with collaborating physicians at distant locations (Sila 2001).

Smart services are not a fad or an anomaly; instead, they represent a fast-growing category of service that extends to many business-to-business (B2B) and business-to-consumer (B2C) settings, such as mechanical engineering, health care, information and communication technology (ICT), automotive, and household appliances (Fano and Gershman 2002). The rapid development of smart services has been pushed by the escalating dispersion of ICTs worldwide, with investments into smart objects and service equipment of more than US$120 billion in 2009 and projected to increase to US$350 billion in 2014 (Harbor Research 2010). In industries that increasingly rely on advanced ICTs, such as manufacturing, medical devices, utilities, mining, and oil and gas, the percentage of smart service–enabled objects among companies' serviceable assets has increased from 11.7% in 2007 to 27.9% in 2009 (Dutta 2009).

[1] Department of Business Administration and Economics, University of Paderborn, Paderborn, Germany
[2] TUM Business School, Technische Universität München, München, Germany
[3] W. P. Carey School of Business, Arizona State University, Tempe, AZ, USA

Corresponding Author:
Nancy V. Wünderlich, University of Paderborn, Warburger Str. 100, 33098 Paderborn, Germany.
Email: nancy.wuenderlich@upb.de

Study 1:

What role will Smart Interactive Services play in the future?

Study 2:

What are the barriers and drivers with regard to Smart Interactive Services and how do they influence users' attitudinal and behavioral responses?

Source: Wünderlich, Wangenheim & Bitner (2012)

Study 1: Delphi study

- Delphi study with 126 renowned experts from the IT (28%), health care (18%), engineering (17%), automotive (8%) and research (14%) sectors.
- In several rounds, the experts were asked for their opinion regarding six central theses on Smart Interactive Services in order to create a general picture of opinion.

Table 1. Theses of the Delphi Study and Expert Opinion After the Second Round[a].

Thesis #	Thesis	Expert Opinion
1	10% of all services that need interactivity will be delivered remotely	31% of all experts agree or strongly agree with this thesis. Most experts foresee this will happen by the year 2020
2	80% of all maintenance and monitoring services for machines and mechanical plants will be delivered remotely	71% of all experts strongly agreed with this thesis. Most experts foresee this will happen by the year 2015
3	80% of all diagnosis and monitoring services in health care will be provided remotely	76% of all experts agree or strongly agree with this thesis. Most experts foresee this will happen by the year 2015
4	80% of all implementation, administration, maintenance, and repair services of information technology (IT)-systems will be done remotely	79% of all experts agree or strongly agree with this thesis. Most experts foresee this will happen by the year 2015
5	80% of all metering services of household appliances, such as heating devices and water supply systems, will be provided remotely	20% of all experts agree or strongly agree with this thesis. Most experts foresee this will happen by the year 2025
6	80% of interactive diagnostic and repair services for cars will be provided remotely	31% of all experts agree or strongly agree with this thesis. Most experts foresee this will happen by the year 2015

Note. [a]In the Delphi study, the theses were stated in relative extreme terms to get the experts to react.

Source: Wünderlich, Wangenheim & Bitner (2012)

Study 2: Interview study

- Interviews with 30 employees of a large printing company regarding Smart Interactive Services offered by printing press manufacturers in the areas of "maintenance", "remote repair" and "remote diagnosis".

- Participants from different areas were interviewed (machine operators, foremen, production managers, service technicians, sales, etc.).

- Conduct in-depth interviews to capture the underlying dimensions of user perception of smart interactive services and interpret the smart interactive service situation.

- All interviews lasted between 60 and 90 minutes and included the following open-ended questions:

    - "What kind of experiences have you had with this type of service?"
    - "Can you describe how you experience the delivery of intelligent interactive services?"
    - "How do you feel during service creation?"
    - "How do you think your counterpart(client/provider) felt during the service delivery process?"
    - "How does your experience with this service type differ from your experience with face-to-face services or self-service services?"

Source: Wünderlich, Wangenheim & Bitner (2012)

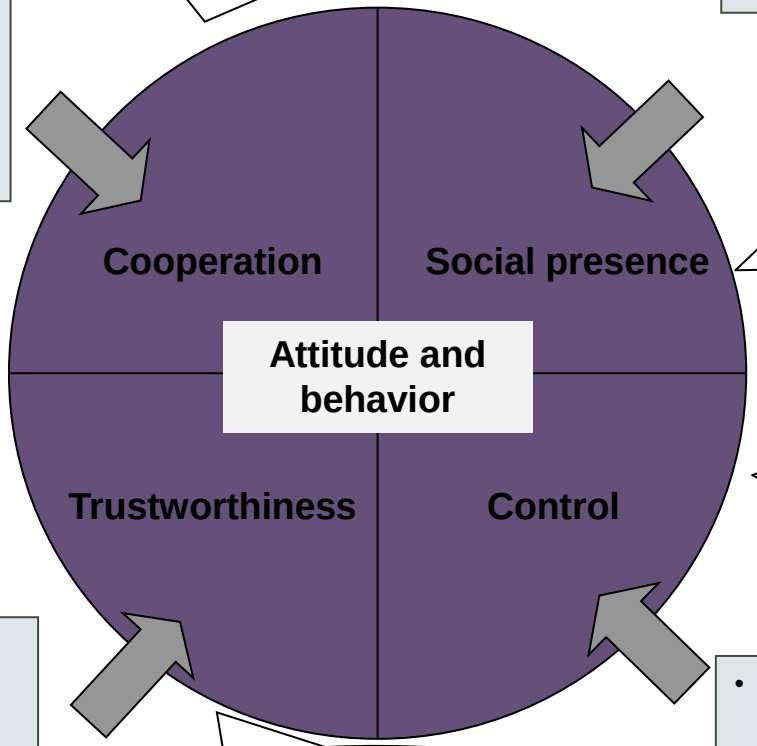
Study 2: Results

- Clear distribution of roles
- Guidance by the processing person
- Self-efficacy expectation
- Readiness

"I like that I have to help the engineer. I feel appreciated and I am happy that he values my support and knowledge. I think that without me, the remote repair would not be effective."

- Social contact
- Personal communication

"Well, yes, I miss the personal contact, because I've liked every one of the guys they've sent in here."



"My trust towards [company name] is based on the relationships I have been with the people, the technicians."

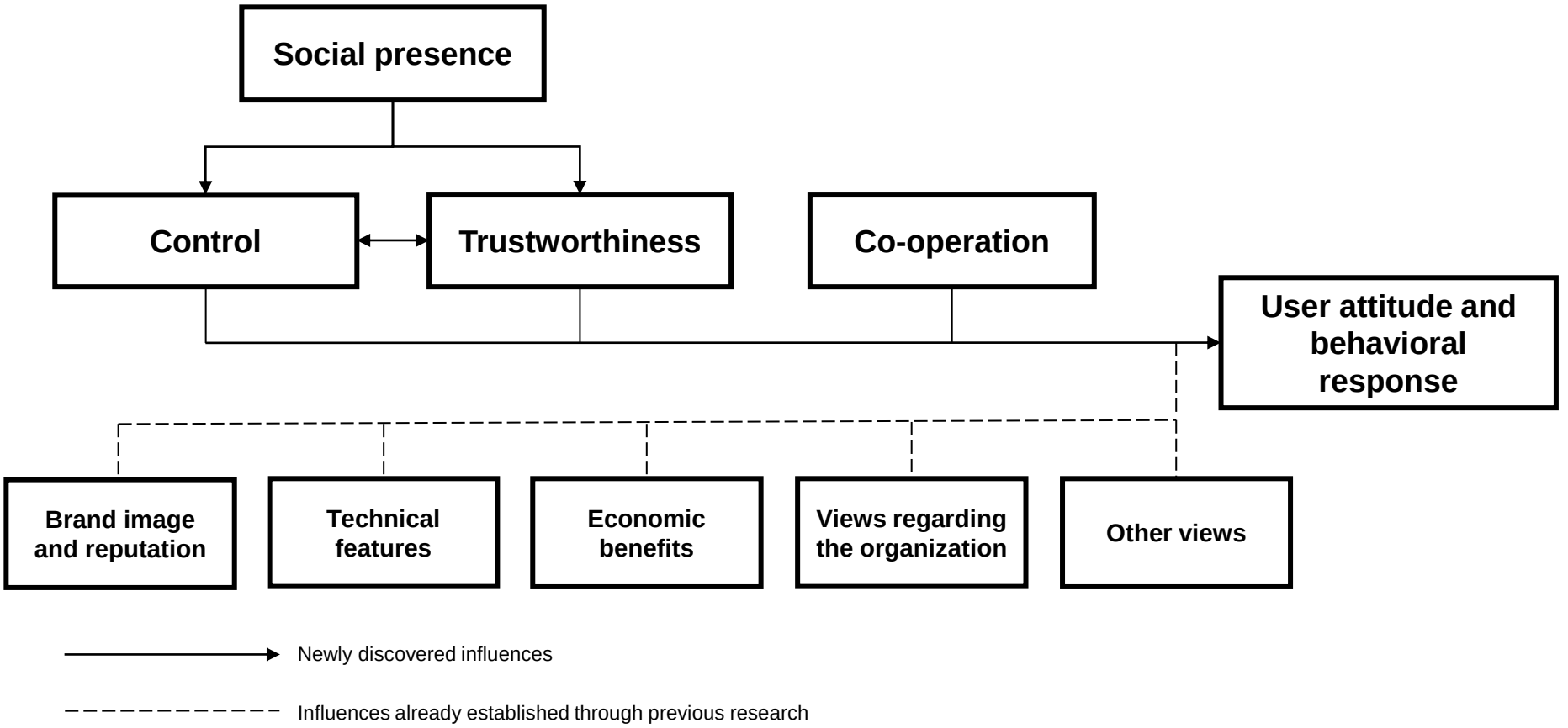
"Control plays a very important role. I want to decide what exactly is done with my machine."

- Reliability of the processing person
- "Goodwill" of the processing person
- Expertise of the processing person

"[The] guy who remotely logs into our machine is most likely the absolute specialist for this model."

- Sense of control over the person processing
- Need for transparency
- Need for control mechanisms

SMART INTERACTIVE SERVICE FRAMEWORK



Source: based on Wünderlich, Wangenheim & Bitner (2012)

KEY MESSAGES STUDY 2

Core statement 1	The perception of control has a positive influence on the user's attitudinal and behavioral responses regarding a Smart Interactive Service.
Core statement 2	The perception of trustworthiness positively influences the user's attitudinal and behavioral responses regarding a Smart Interactive Service.
Core statement 3	A lack of trust cannot be compensated by a good image and reputation of the service provider.
Core statement 4	The amount of control desired and perceived trustworthiness are interdependent, such that (a) greater trustworthiness leads to less desire for control and (b) greater control leads to less importance of trustworthiness with respect to attitudinal and behavioral responses of the user.
Core statement 5	The perception of social presence during smart service delivery helps build trust and also leads to a reduced need for control.
Core statement 6	The perception of collaboration has a positive impact on the user's attitudinal and behavioral responses regarding a Smart Interactive Service.

Source: Wünderlich, Wangenheim & Bitner (2012).

Study: AI-based interactive services in health care

Berner Fachhochschule | Haute école spécialisée bernoise | Bern University of Applied Sciences

ROBO-ADVISORS WILL INCREASINGLY REPLACE HUMAN ADVICE

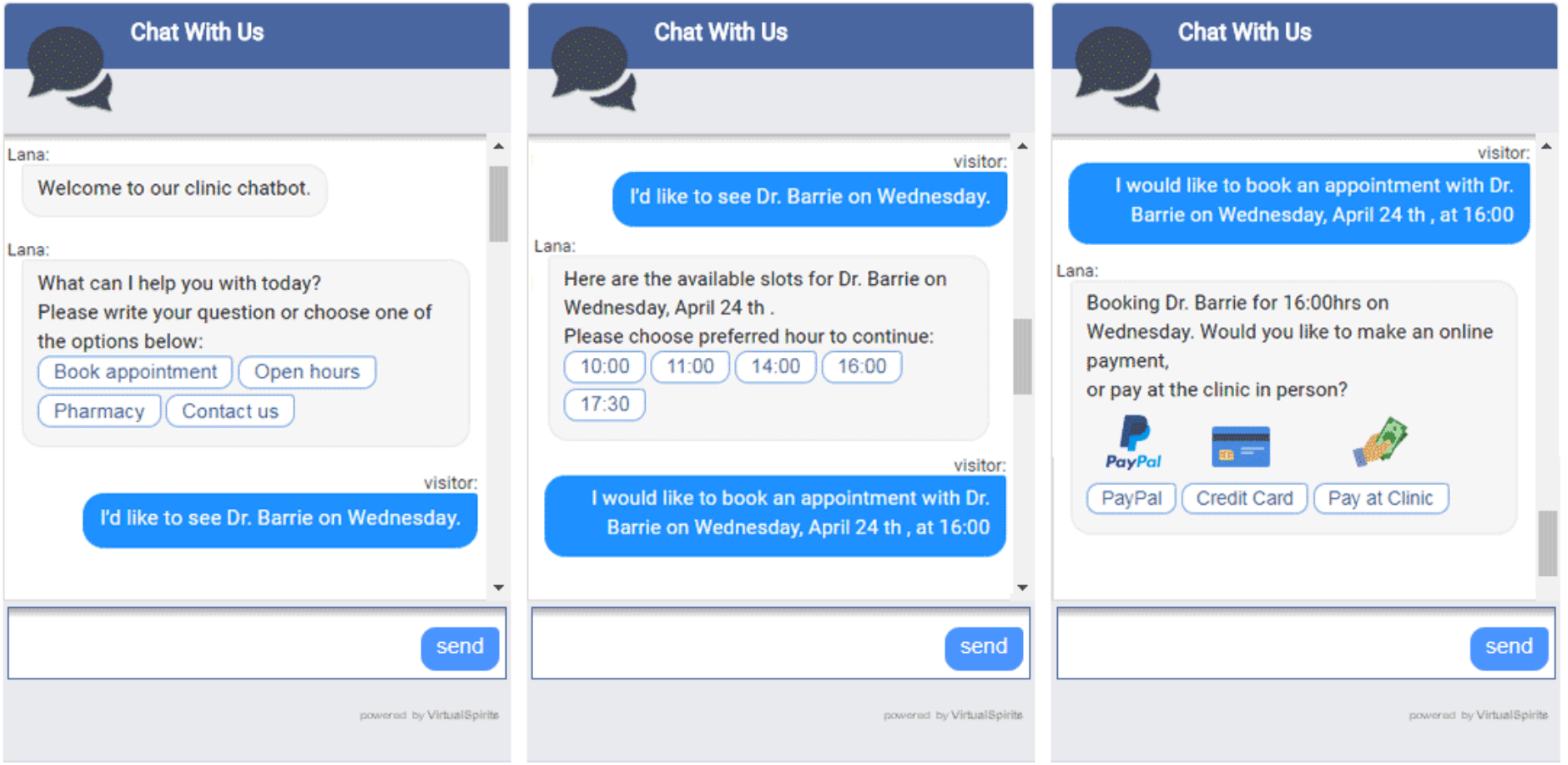
Personal medical consultation ...

... will become digital, AI-based consulting

Personal face-to-face interactions ...

... Will become digital and anonymous interactions with the "robo-doc"

AI-BASED CONSULTING SERVICES IN MEDICAL PRACTICES AND CLINICS



BACKGROUND & RESEARCH QUESTIONS

on AI based smart interactive services

Background:

From a behavioral psychology perspective, it is unclear how customers will react to AI-based smart interactive services, how they need to be designed (social support vs. no social support), and how they will impact existing service relationships.

How does the introduction of robo-advisors and chatbots affect existing service relationships?

SERVICE RELATIONSHIPS: RELATIONSHIP FORMS INFLUENCE EXPECTATIONS

- Different forms of relationships shape expectations of relationship partners (social relationship theory) (e.g., Clark & Mils 1993)

AI based can be good idea

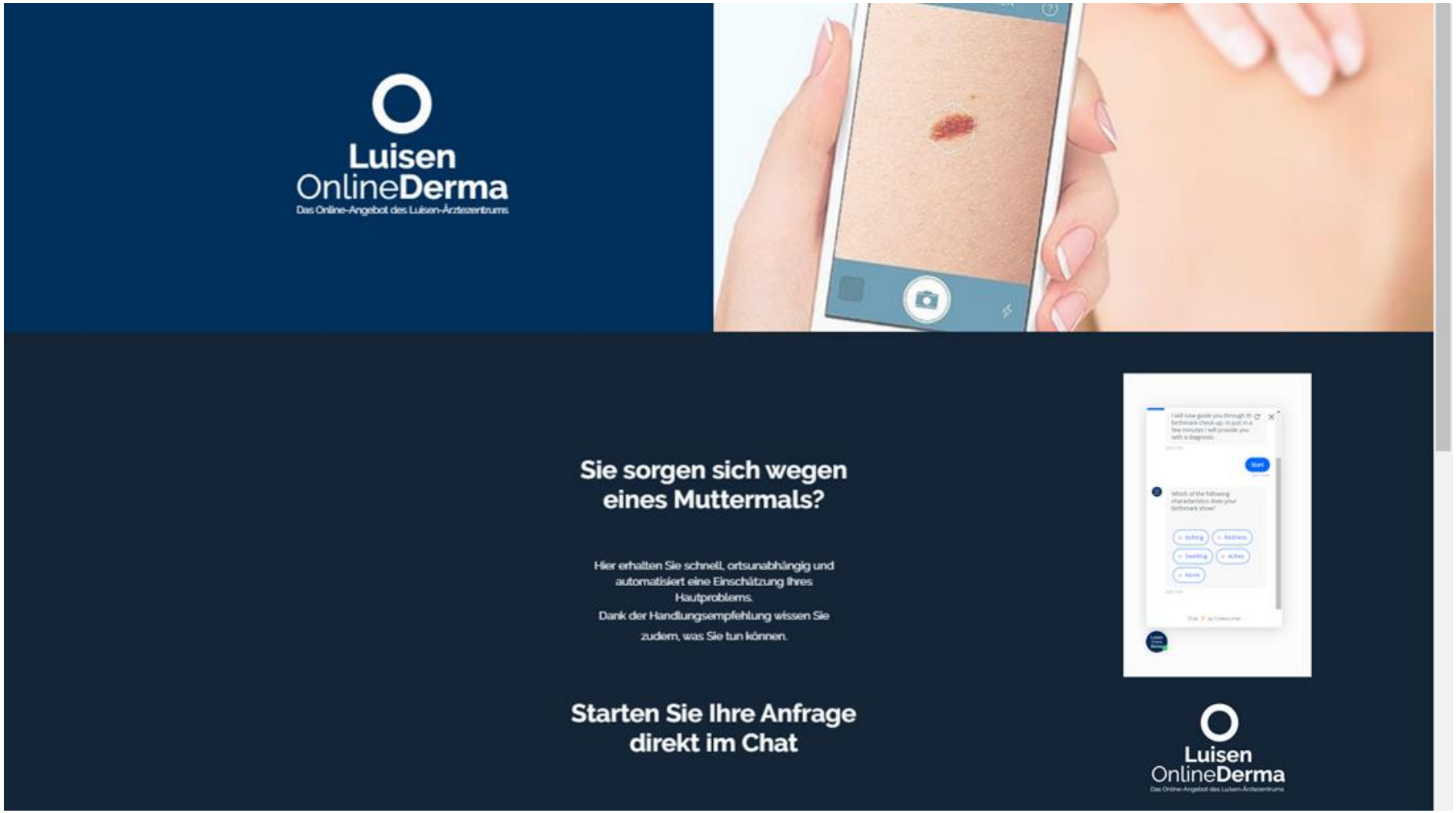
- **Exchange relationship**: functional, rational, unemotional, follow quid pro quo principle.

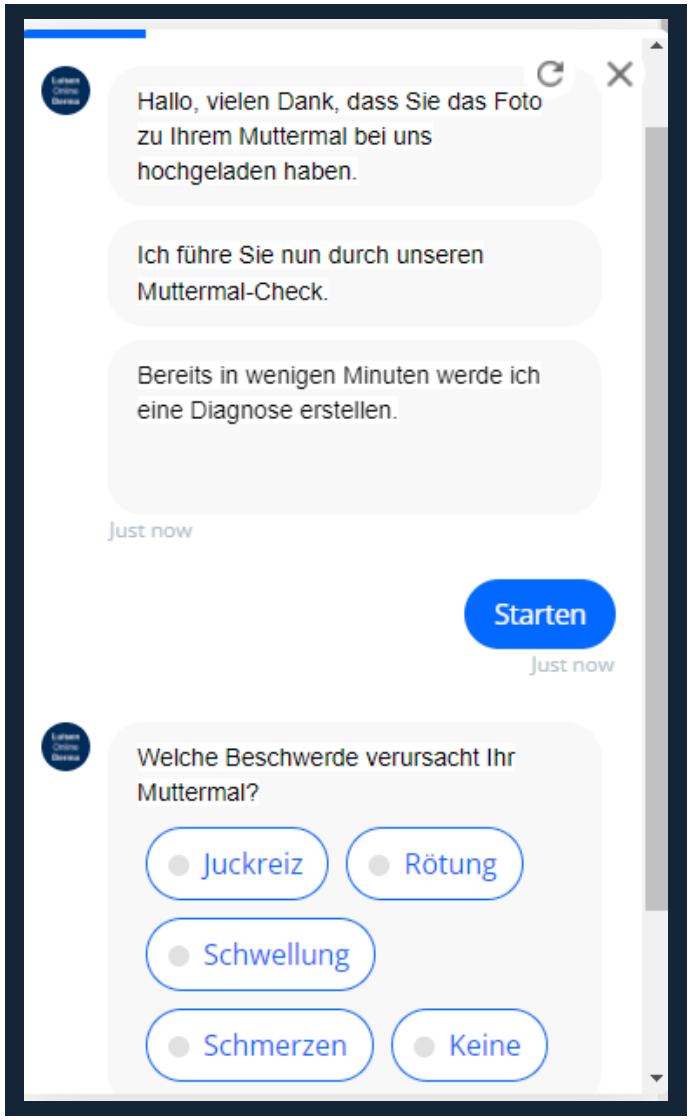
AI based not good idea

- **Communal relationship**: tends to be empathic, *socially supportive,* and altruistic.
  - **Social support:** feeling cared for and having one's fears taken seriously (e.g., Lakey & Cohen 2000; Li et al. 2018).

AI-based advice must meet relationship expectations or existing client/patient relationships may be negatively impacted.

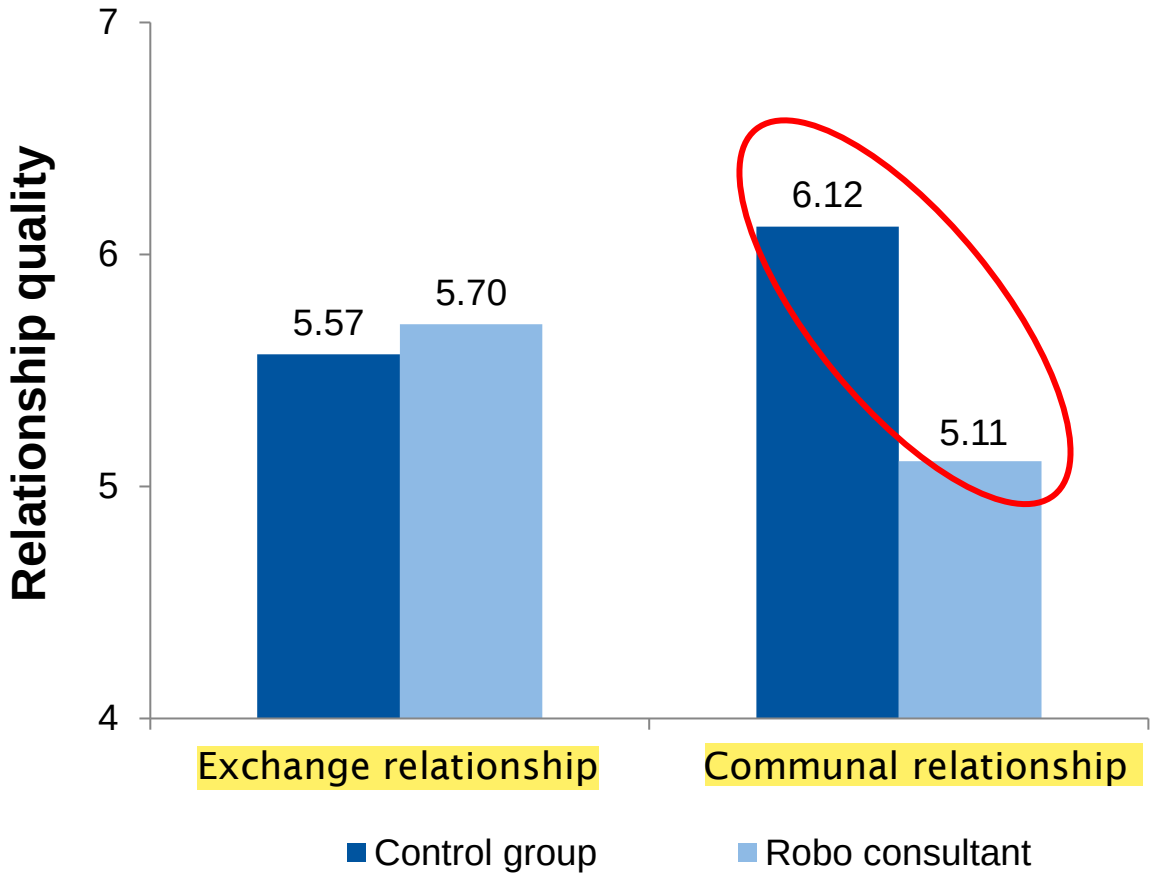
EXPERIMENT


Luisen
OnlineDerma
Das Online-Angebot des Luisen-Ärztezentrums
Sie sorgen sich wegen eines Muttermals?
Hier erhalten Sie schnell, ortsunabhängig und automatisiert eine Einschätzung Ihres Hautproblems.
Dank der Handlungsempfehlung wissen Sie zudem, was Sie tun können.
Starten Sie Ihre Anfrage direkt im Chat
Luisen
OnlineDerma


Hallo, vielen Dank, dass Sie das Foto zu Ihrem Muttermal bei uns hochgeladen haben.
Ich führe Sie nun durch unseren Muttermal-Check.
Bereits in wenigen Minuten werde ich eine Diagnose erstellen.
Just now
Starten
Just now
Welche Beschwerde verursacht Ihr Muttermal?
Juckreiz
Rötung
Schwellung
Schmerzen
Keine


Welche Form weist das Muttermal auf?
Just now
Ungleichmäßige Form
Just now
Weist das Muttermal mehrere unterschiedliche Farbtöne auf?
Just now
Nein
Just now
Wie würden Sie die Oberflächenbeschaffenheit charakterisieren?
flach
erhöht
einzelne knotige Erhebungen

RESULTS


Relationship quality
7
6
5
4
5.57
5.70
6.12
5.11
Exchange relationship
Communal relationship
Control group
Robo consultant

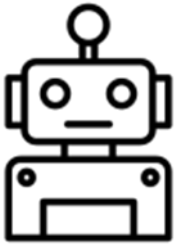
How does the introduction of robo-advisors and chatbots affect existing service relationships?

SO WHAT? NO "ONE-SIZE FITS ALL"!

Customer / patient segment

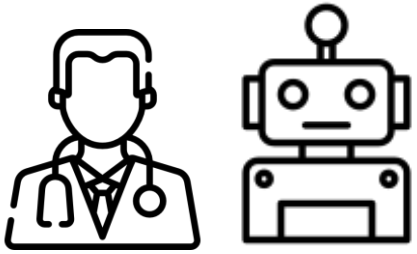
Customers / patients in exchange relationship

Robo consultant



Clients / patients in communal relationship

Hybrid (robo advisor + human back-up)

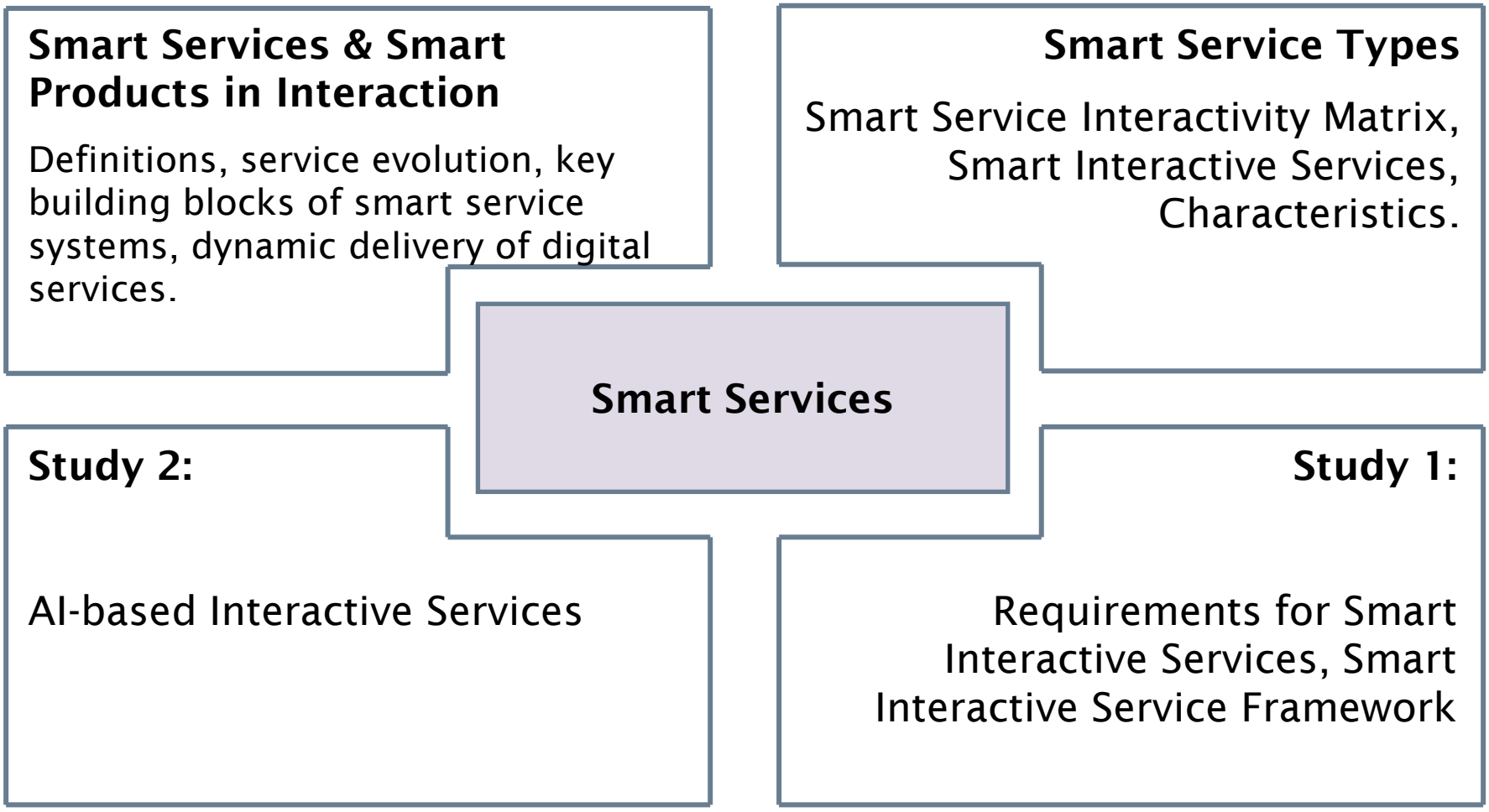


IT revolution and service revolution: smart products become smart services

Summary

Berner Fachhochschule | Haute école spécialisée bernoise | Bern University of Applied Sciences

WRAP-UP


Smart Services & Smart Products in Interaction
Definitions, service evolution, key building blocks of smart service systems, dynamic delivery of digital services.
Smart Service Types
Smart Service Interactivity Matrix, Smart Interactive Services, Characteristics.
Smart Services
Study 2:
AI-based Interactive Services
Study 1:
Requirements for Smart Interactive Services, Smart Interactive Service Framework

LITERATURE SOURCES:

- Allmendinger, G & Lombreglia, R 2005, 'Four strategies for the age of smart services', *Harvard Business Review*, vol. 83, no. 10, 131.
- Beverungen, D., Müller, O., Matzner, M., Mendling, J., & Vom Brocke, J. (2019). Conceptualizing smart service systems. *Electronic Markets*, *29*(1), 7-18.
- Huang, M-H & Rust, RT 2018, 'Artificial Intelligence in Service', *Journal of Service Research*, vol. 21, no. 2, pp. 155-172.
- Lovelock, C.; Wirtz, J. (2016): Services Marketing: People, Technology, Strategy, Global Edition, 7th ed, Upper Saddle River: Pearson Education.
- Rust, R. T., & Huang, M.-H. (2014). The service revolution and the transformation of marketing science. *Marketing Science*, 33 (2), 206-221.
- Wünderlich, NV, Wangenheim, Fv & Bitner, MJ 2012, 'High Tech and High Touch', *Journal of Service Research*, vol. 16, no. 1, pp. 3-20.